

12.3 WETLANDS

12.3.1 Wetland Assessment(Field Observations)

A. SELECTION OF SAMPLING LOCATION

For each wetland evaluated, one location shall be sampled that best represents the entire wetland. A wetland Assessment Form shall be filled-out for each wetland evaluated. The Wetland Assessment Field Form can be found in Section 21.1.1.6.

B. OBSERVATION MEASUREMENTS

Information to be included from observations using a field form includes the wetland name, date and time collected, location description, GPS location, degree, cause and source of impairment, general land uses in the watershed, primary wetland use, estimated area and maximum depth, hydrology, aquatic and riparian vegetation, upland vegetation in the wetland watershed, algae and macroinvertebrates observed, substrate, water color, and percent open water.

Other information obtained using maps and surveys includes the local geology, geomorphology, legal description, ownership, and ecoregion.

C. SEDIMENT SAMPLING

Composite sediment samples should be collected from the top 10cm of the wetland benthic zone. The sample composite shall be collected in a 50ml plastic container and analyzed for total recoverable metals using ICP SCAN. The selection of contaminants that are usually analyzed at low level detection shall include arsenic, selenium, and mercury. Transport the sediment samples in a cooler with ice to the laboratory.

D. WATER SAMPLING

Collect water samples using 250ml plastic bottles for analysis of common ions and total recoverable metals. Collect the nutrient and total organic carbon sample using a 1 liter bottle. Bottles shall be rinsed 3 times with sample

before collection. Nutrients and total organic carbon shall be preserved with sulfuric acid. Total recoverable metals shall be preserved with nitric acid. Water samples shall be transported to the laboratory in a cooler and iced immediately after collection. Measure conductivity, turbidity, pH, dissolved oxygen, and temperature in the field using a Horiba U-10 Water Quality Checker or similar device.

E. ANALYTICAL METHODS

Sediments shall be oven dried at 90 °C, ground, and sieved with a U.S. Standard No. 10 sieve for trace metal analysis. Sediments shall be digested using nitric acid and a microwave (Method 3051 EPA Manual SW-846, November 1990). This method reflects the maximum concentration of available trace metals contaminants tied-up in the sediment that could be released to the aquatic environment.

All chemical analytical procedures shall follow approved EPA methods. Trace metals shall be analyzed using the inductively coupled plasma-atomic emission spectrometric method (ICP) and/or atomic absorption (AA) spectroscopy. Mercury shall be analyzed using cold vapor atomic absorption spectroscopy.

Chemical Analysis of Water Column:

1. Common Ions - cation/anion balance

calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, hardness, total alkalinity, sodium adsorption ratio

2. Nutrients

total phosphorus, ortho-phosphorus, total Kjeldahl nitrogen, total nitrate-nitrite, total ammonia

3. Total recoverable metals

aluminum, arsenic, boron, cadmium, chromium, copper, iron, lead, nickel, selenium, zinc

4. Field Parameters

pH, conductivity, temperature, salinity, turbidity, dissolved oxygen, color

5. Other Parameters

total organic carbon, silica

Chemical Analysis of Sediment

1. ICP Scan

aluminum, antimony, beryllium, boron, cadmium, calcium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, silica, vanadium

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2. Low Level Detection (Atomic Absorption)

arsenic, selenium, mercury

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12.3.2 Bacteria

Information concerning bacteria can be found in Streams,
Section 12.1.1.

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12.3.3 Periphyton

Collect periphyton from natural substrates (i.e., vegetation, top layer of the sediment, submerged woody debris, etc.). Use a spoon or knife to aid in collection. Combine the periphyton samples from a wetland site into a single composite sample. The sample shall be collected in a plastic container with site water and preserved with Lugol's solution and kept chilled. Samples shall be sent to a consultant at the end of the field season for taxonomic identification and metric determinations.

The DEQ is currently developing diatom biocriteria and bioassessment protocols for wetlands. The DEQ has developed a method for detecting water quality impairment using multivariate analysis (refer to "Developing Bioassessments for Montana Wetlands", draft report, Apfelbeck, R. (1997)).

REFERENCES

Procedures for the assessment of periphyton in lakes (Section 12.2.4) may be applied in the assessment of periphyton in wetlands. See also the applicable portions of periphyton in streams (Section 12.1.2).

Developing Bioassessments for Montana Wetlands, draft report, Apfelbeck, R. (1997).

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12.3.4 Macroinvertebrates

12.3.4.1 Sampling Methods (D-Frame Net)

Macroinvertebrate samples shall be collected using a sweep net to sample the littoral region and benthic (sediment) surface. An attempt shall be made to select at least 200 macroinvertebrates that represent all the microenvironments within the sampling area. Samples shall be composited within a 1 liter plastic container and preserved with 95% ethanol. The samples shall be sent to a consultant at the end of the field season for taxonomic identification and metric determinations.

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12.3.4.2 Sample Processing and Analysis

The macroinvertebrate samples shall be analyzed for both community composition and community structure. Metric calculations shall include diversity, taxa richness, percent dominant taxa, etc.

Taxonomic classification of macroinvertebrates, metric calculations, statistical data analysis, evaluation of environmental factors, and development of biocriteria and bioassessment protocols are currently being performed by the DEQ.

For additional information, refer to Section 12.2.5.2, Lake Macroinvertebrate Sample Processing and Analysis and wetlands draft document "Developing Bioassessments for Montana Wetlands", draft report, Apfelbeck, R. (1997).